"PATENT"

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Sebastian C. Reyes, et al.	§	EXAMINER:	Tam. M. Nguyen
SERIAL NUMBER: 10/699,258	§	GROUP ART UNIT:	1764
FILED: October 31, 2003	§	ATTY. DOCKET NO.:	JCW-0306
FOR: LIGHT HYDROCARBON SEPARATION USING 8-MEMBER RING ZEOLITES	§	FAMILY NO.:	P2003J087

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 CFR §1.132

1. I, Sebastian C. Reyes, do declare and say as follows:

2. I am a co-inventor of the invention set forth in the above-noted patent application and I am making this declaration in support of the patent application;

3. I am presently employed with ExxonMobil Research and Engineering Company;

4. I am a Senior Research Associate and have been working in the field of petroleum fuels processes for 21 years, providing research guidance and engineering;

5. My academic training is set forth as follows:

University of Minnesota, Ph.D. Chemical Engineering, 1985

University of Concepción, Chile, M.S. Chemical Engineering, 1981

University of Concepción, Chile, B. S. Chemical Engineering, 1979

6. I am familiar with the disclosure of the subject matter in the subject patent application;

7. I have read the Examiner's Office Action mailed August 22, 2006 concerning the subject patent application and claim rejections made therein;

8. In my opinion, to one of ordinary skill in the art, the use of the term "SiO_2/Al_2O_3 ratio" as used in the present application is equivalent to "SiO_2/Al_2O_3 molar ratio". In either industry or academy, in the context of defining a zeolite framework composition, the two terms are used interchangeably. When using the term "SiO_2/Al_2O_3 ratio", there is never a confusion that such a ratio would refer to a mass basis. Only a molar basis has a proper physical meaning attached to it.

Perhaps it is instructive to point out that the instances in which either of the terms "SiO_2/Al_2O_3 mass ratio" or "mass SiO_2/Al_2O_3 ratio" appear in writing in either the patent or journal literature are practically zero relative to the term "SiO_2/Al_2O_3 ratio". A quick web search returns zero hits for the former terms but abundant hits for the latter.

A clear illustration that the term "SiO_2/Al_2O_3 ratio" is commonly used without ambiguity, comes from a classical and respected book in the area of adsorptive separations. The book is called "Principles of Adsorption and Separation Processes" (D. M. Ruthven, John Wiley and Sons, New York, 1984), whose contents are very pertinent to the subject matter of the present application. On page 10 of this reference (copy of page attached), in the very first instance in the book in which the author refers to framework composition in zeolites states: "The Si/Al ratio in the zeolite...". Such wording is ubiquitous throughout the book but there no confusion that the implied meaning is a molar ratio.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed true; and that these statements were made with the knowledge that willful false statements and the like so

made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patents issuing thereon.

Signed: Sebastian C. Reyes

Sebastian C. Reyes

Date: Dec 6 2006

PRINCIPLES OF ADSORPTION AND ADSORPTION PROCESSES

DOUGLAS M. RUTHVEN
University of New Brunswick, Fredericton

A Wiley-Interscience Publication
JOHN WILEY & SONS
New York · Chichester · Brisbane · Toronto · Singapore

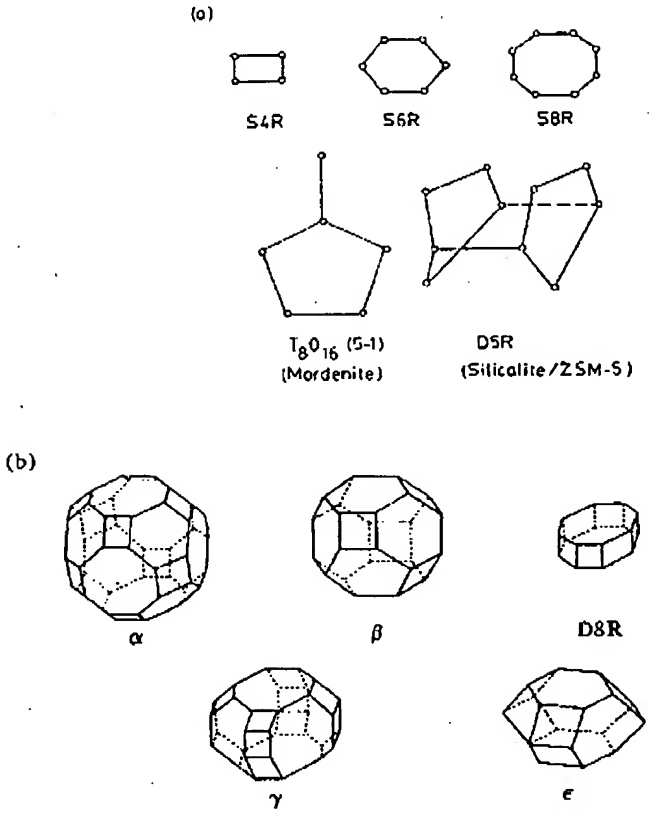

FIGURE 1.4. (*a*) Secondary building units and (*b*) commonly occurring polyhedral units in zeolite framework structures. (From ref. 19, copyright John Wiley & Sons, Inc., 1974; reprinted with permission.)

locations has been recently summarized by Mortier.[25] Changing the exchangeable cation by ion exchange provides a useful and widely exploited means of modifying the adsorptive properties.

The Si/Al ratio in a zeolite is never less than 1.0 but there is no upper limit and pure silica analogs of some of the zeolite structures have been prepared. The adsorptive properties show a systematic transition from the aluminum-rich sieves, which have very high affinities for water and other polar molecules, to the microporous silicas such as silicalite which are essentially hydrophobic and adsorb *n*-paraffins in preference to water. The transition from hydrophilic to hydrophobic normally occurs at a Si/Al ratio of between 8 and 10. By appropriate choice of framework structure, Si/Al ratio and cationic

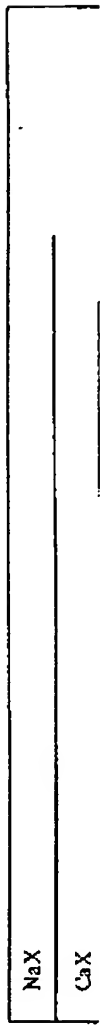

FIGURE 1
Lennard-Jo
occurs betw
Sons, Inc.,